

**Before The  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

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In The Matter Of	)	
	)	
Unlicensed Operation in the TV Broadcast Bands	)	ET Docket No. 04-186
	)	
Additional Spectrum for Unlicensed Devices	)	ET Docket No. 02-380
Below 900 MHz and in the 3 GHz Band	)	
_____	)	

To: The Commission

**COMMENTS OF QUALCOMM INCORPORATED**

Dean R. Brenner  
Senior Director, Government Affairs  
QUALCOMM Incorporated  
2001 Pennsylvania Ave., N.W.  
Suite 650  
Washington, D.C. 20006  
(202) 263-0020  
Attorney for QUALCOMM Incorporated

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## **SUMMARY**

QUALCOMM has two interests in this proceeding. First, QUALCOMM holds licenses covering the entire nation on Block D in the Lower 700 MHz band, Channel 55. QUALCOMM is launching an innovative, exciting service on that band to deliver multimedia content to mobile devices. QUALCOMM cannot launch its new service on its licensed spectrum if the FCC were to allow unlicensed devices on Channel 55 or adjacent Channels 54 and 56.

The NPRM posits theories for mitigation of interference from unlicensed devices, such as deployment of new interference sensing radios, but to QUALCOMM's knowledge, these theories have not been tested, much less proven to work. Licensees in the Lower 700 MHz band already face a daunting obstacle, completion of the DTV transition, before the spectrum will be clear in all markets. In markets where there are no analog TV stations on Channels 54-56, QUALCOMM can launch its new service now, but not if the FCC allows unlicensed devices on these channels. It would be grossly unfair and contrary to the public interest for the FCC to make it impossible for licensees to use the spectrum after auctioning it without such restrictions.

Fortunately, the NPRM does not propose to permit unlicensed operations on Channels 52-69, and any decision should follow suit. But, allowing unlicensed devices on Channels 5-36 and 38-51 could prolong the DTV transition by complicating the channel selection process and causing interference to TV sets, just as the FCC is urging consumers to buy new DTV receivers. The FCC should await the outcome of the DTV transition and a conclusive demonstration of non-interference before authorizing new services on vacant Channels 5-36 and 38-51.

Second, QUALCOMM is the inventor and developer of the essential technologies that underlie the preeminent 3G wireless broadband standards, 1xEV-DO and WCDMA, which use licensed spectrum to deliver ubiquitous wireless broadband service. Carriers who deploy these

licensed wireless broadband technologies depend upon exclusive use of their spectrum, free of interference from unlicensed devices. Allowing unlicensed devices to operate in licensed spectrum, in the absence of a clear and convincing showing of the absence of harmful interference, a showing not made here, impairs licensed services and undermines the value of licensed spectrum. The Commission should not set such a precedent in this proceeding.

The NPRM gives scant justification for proposing unlicensed services on the vacant TV channels, as opposed to allowing licensed services on the spectrum if indeed it is vacant. The Commission has recently allocated a large amount of dedicated spectrum for unlicensed devices in a host of frequency bands, including 255 MHz in the 5 GHz band, and is considering additional allocations, such as at 3650-3700 MHz. The NPRM simply asserts, with no evidence, that there is a need for additional unlicensed spectrum, and it leaps to the conclusion that allowing unlicensed devices to operate in the licensed TV bands is the best way to meet the need. To the contrary, for the FCC to give away prime spectrum (immediately adjacent to the 700 MHz auctioned spectrum) for free, albeit on an unlicensed basis, is likely to deter investment in licensed spectrum, degrade the value of adjoining licensed spectrum, and depress future auction prices. If there is a need for more spectrum for unlicensed devices, the FCC should allocate dedicated bands where the interference can be contained, rather than authorizing unlicensed devices to operate in licensed bands as the FCC has proposed here.

Indeed, in proposing to allow new services on the vacant TV channels, the NPRM fails even to consider why such services should not be licensed services, as opposed to unlicensed services. If new services are to be allowed on these valuable frequencies, the Commission should seriously consider authorizing licensed services on the spectrum. The spectrum at issue is prime spectrum—it enables wide propagation of radio signals. To authorize unlicensed services

on this spectrum limits the breadth of the services that can be offered and denies the public of the highest and best use of the spectrum, not to mention the auction revenues that would be generated from a sale of this spectrum.

Moreover, licensed services operate under tight, well-defined parameters—the interference from such services can be reliably predicted and avoided. This is assuredly not the case for unlicensed services. Once these devices are sold, no one tracks where the devices are operated, and it is impossible to pinpoint and cure the harmful interference. There are no interference sensing radios available today that can be put into unlicensed devices to ensure the absence of interference. All interference problems will not be cured simply with interference-sensing techniques. There will be situations in which a device will not be able to sense that a TV station is operating on a channel, and it causes harm to a nearby TV receiver (the so-called hidden terminal problem). These situations could be especially pronounced because of the long distance propagation of the signals on the TV bands over areas near water. In addition, the NPRM is silent on what will prevent unlicensed devices from interfering with one another.

The NPRM proposes simply that the unlicensed devices in the TV band would operate subject to the general duty in Section 15.5 of the FCC's rules not to cause harmful interference and to cease operating upon notification from the FCC that the device causes harmful interference. This approach is not practical. It is not clear how interference from unlicensed devices can be pinpointed, especially once thousands and potentially millions of the devices are operating on a mobile basis. There is no mechanism in place for the recall of millions of such devices. Once they spread around the country, it will be too late to mitigate the interference.

In other unlicensed bands, interference problems are inherently limited in scope because of the limited propagation of signals in the band. But, the spectrum at issue here, below 700

MHz, enables much wider propagation than the other unlicensed bands. Interference from unlicensed operations in the TV bands is likely to be of a much greater magnitude than has been experienced in the other unlicensed bands.

For all these reasons, QUALCOMM urges the FCC not to authorize unlicensed devices to operate in the TV bands at this time. A significant amount of work needs to be done on the mitigation of interference, and the DTV transition needs to be concluded, before the FCC should consider going forward. Even then, if there are any truly vacant TV channels from Channels 5-36 and 38-51, the FCC should seriously consider a licensed, rather than unlicensed, service.

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To: The Commission

**COMMENTS OF QUALCOMM INCORPORATED**

QUALCOMM Incorporated (“QUALCOMM”) hereby submits its Comments on the Notice of Proposed Rule Making, FCC 04-113, released May 25, 2004, (“NPRM”), in which the Commission proposed allowing unlicensed devices to operate on the so-called vacant channels in the TV bands within Channels 5-36 and 38-51.

**I. QUALCOMM’s Interests in This Proceeding**

As set forth in the foregoing Summary, QUALCOMM has two important interests in this proceeding: 1) QUALCOMM is the licensee of a nationwide swath of Lower 700 MHz spectrum, Block D, which is TV Channel 55, on which QUALCOMM is launching an exciting new service; and, 2) QUALCOMM is the inventor and developer of the essential technologies that underlie the preeminent 3G wireless broadband standards, 1xEV-DO and WCDMA, which operate on licensed spectrum. These interests are both implicated by the proposal in the NPRM to allow unlicensed devices to operate in TV bands, as explained below.

### **A. QUALCOMM's Planned Use of Its Lower 700 MHz Licensed Spectrum**

In 2002, while the DTV transition was under way, the Commission began auctioning Lower 700 MHz spectrum, i.e., the spectrum consisting of TV Channels 52-59 that the Commission will ultimately recover from the analog TV station incumbents at the end of the transition. In FCC Auction No. 49, which ended in June 2003, QUALCOMM purchased licenses for five of the six Economic Area Groupings ("EAGs") on Block D in the Lower 700 MHz band, TV Channel 55, for approximately \$38 million.<sup>1</sup> In October 2004, in an after-auction transaction, QUALCOMM purchased the license for the sixth EAG on Block D in the Lower 700 MHz band. As a result, QUALCOMM now holds licenses for all six EAGs on Block D, covering the entire nation on that band.

Earlier this month, QUALCOMM announced its plans to deploy and operate a nationwide "mediacast" network on its Lower 700 MHz spectrum to deliver many channels of high quality video and audio programming to 3G mobile phones at mass market prices. This system, to be operated through a QUALCOMM subsidiary named MediaFLO™ USA Inc., will give TV stations and networks, cable TV and satellite operators and networks, and other content providers a major new distribution channel that complements their current offerings, enabling them to reach their audiences when they are away from home and on the go. In addition, there are a number of innovative and highly beneficial public service applications that can be delivered as part of this new network.

QUALCOMM intends to offer its network as a shared resource for U.S. CDMA2000 and WCDMA (UMTS) cellular and PCS operators, enabling them to deliver mobile interactive multimedia to their wireless subscribers without the cost of network deployment and operation.

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<sup>1</sup> QUALCOMM used its Auction Discount Voucher, which it had been awarded by the Commission in satisfaction of its request for a pioneer's preference, to pay the bid price.



By deploying QUALCOMM's so-called FLO™ (forward link only) technology on QUALCOMM's spectrum in the Lower 700 MHz band, QUALCOMM's network will enjoy distinct efficiency and cost advantages in delivering multimedia content to a very large subscriber base. Deploying high-power transmitters on tall towers on the licensed Lower 700 MHz spectrum, in accordance with the Commission's rules governing operations on this band, will provide superior coverage with 30 to 50 times fewer towers as compared to cellular and higher frequency-based systems. The cash requirements for the MediaFLO™ USA Inc. business plan are expected to be approximately \$800 million over the next four to five years.

This new service is very much in the public interest. It is a service that will spawn new content, new devices, and new applications not now imagined, and as a result, it will drive economic growth and consumer welfare. QUALCOMM can deploy the service in markets in which there are no incumbent analog TV stations on Channel 55 or adjacent Channels 54 and 56, but not if the Commission authorizes unlicensed devices to operate on these channels.<sup>2</sup>

#### **B. QUALCOMM's 3G Wireless Broadband Technologies On Licensed Spectrum**

QUALCOMM is the inventor and developer of the essential technologies that underlie the preeminent 3G wireless broadband technologies, 1xEV-DO and WCDMA, which operate on licensed spectrum to deliver ubiquitous wireless broadband service. By way of background, QUALCOMM has developed core technology known as code division multiple access ("CDMA"). This technology has been incorporated into standardized technologies deployed by wireless carriers in the United States and around the world, including cdmaOne™, which is the

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<sup>2</sup> Under Part 27 of the Commission's Rules, QUALCOMM can also launch its service in markets where there are incumbents on Channels 54 and/or 56 if QUALCOMM can make an adequate showing of non-interference. But, if the Commission were to authorize unlicensed devices to operate on Channels 54 and 56, QUALCOMM's new service would be substantially jeopardized by the interference from unlicensed devices.

second generation (2G) version of CDMA, and CDMA2000 and Wideband CDMA (WCDMA, which is also known as UMTS), the third generation (3G) versions of CDMA.

CDMA is proliferating at a very rapid pace, here in the United States, where it is the fastest growing wireless technology, and around the world. 3G CDMA networks have been deployed by a total of 113 wireless operators, which are based in the United States and 49 other countries around the world. A total of 75 of these operators have reported that they already have a total of over 140 million subscribers for 3G CDMA services. Operators in the United States and elsewhere around the world who have deployed 3G CDMA have experienced dramatic and rapid growth in both in terms of numbers of subscribers and average revenue per subscriber.<sup>3</sup>

Wireless operators are deploying a number of different CDMA technologies to provide 3G products and services. Operators who ran CDMA networks to provide 2G services are deploying CDMA2000 technologies (one of the two primary forms of 3G CDMA) so that they can offer 3G services without having to add spectrum. These technologies, which are known as 1X and 1xEV-DO, operate on 1.25 MHz channels, a narrow swath of spectrum. Other operators, who run GSM or TDMA-based networks for 2G services are in the midst of deploying WCDMA (the other primary form of 3G CDMA) to provide 3G services. WCDMA operates on 5 MHz channels, a much wider swath of spectrum. A third CDMA technology, a TDD-based (time division duplex-based) CDMA technology by the name of TD-SCDMA is being considered for deployment in China to enable the provision of 3G services on unpaired spectrum, and TD-CDMA is another variant of time division-based CDMA technology.

CDMA networks operate today in the United States on licensed PCS and cellular spectrum in the 800 MHz and 1.9 GHz bands, and operators have collectively spent tens and tens

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<sup>3</sup> Additional information about the proliferation of 3G CDMA services is available at [www.3gtoday.com](http://www.3gtoday.com).

of billions of dollars on these networks. In addition, versions of CDMA may be deployed in terrestrial networks operating at the 700 MHz, 2500-2690 MHz , and 1.7/2.1 GHz bands.

CDMA technology has also been deployed in satellite-based networks in the Ku-Band and the Big Leo Band.

CDMA technology uses licensed spectrum in the most efficient manner possible, to create as much capacity as possible for voice communications and the greatest speed and throughput for data. The power control inherent in CDMA networks and mobiles ensures that each mobile always transmits exactly enough power to provide satisfactory call quality, but not more than enough. Even a relatively small increase in the noise temperature from the operation of unlicensed devices in a frequency band in which a CDMA network operates will substantially decrease the coverage area of the CDMA network and limit the battery life of CDMA mobiles. Accordingly, a decision by the Commission to permit the operation of unlicensed devices to operate in a licensed band, as proposed in the NPRM, would jeopardize the sanctity of licensed spectrum on which the operators of CDMA networks rely.

It bears emphasizing that QUALCOMM is not at all opposed to unlicensed operations. In fact, QUALCOMM is developing unlicensed wireless technology based on 802.11n. But, these unlicensed operations should not take place in licensed frequency bands, where the interference from unlicensed devices cannot be contained and mitigated. Rather, the Commission should continue to assess the needs of both licensed and unlicensed services for spectrum and allocate dedicated frequency bands in accordance with such assessment.

## **II. The Commission Should Not Permit Unlicensed Operations on Channels 52-69**

The NPRM correctly states as follows:

In view of our reallocation of channels 52-69 from television to other services, we are further proposing not to allow unlicensed devices on those channels. While channels 52-69 continue to be used for TV broadcasting pending the completion of the DTV transition, they are now available for new uses in areas where they are not used for television service. In order to avoid potential sharing difficulties between new uses and unlicensed operations, we believe the most prudent course is simply to preclude unlicensed devices from those channels from the outset of the new authorization proposed herein.

NPRM at para. 34.

QUALCOMM agrees wholeheartedly with this portion of the NPRM. QUALCOMM can launch its new MediaFLO™ network in markets where there are no incumbent TV stations on Channels 54-56, but not if the Commission changes its rules to allow unlicensed devices to come onto those channels. There would be no sound basis for the Commission to allow unlicensed devices to operate on those channels. The Commission auctioned Lower 700 MHz spectrum based on rules which allow the new licensed services to launch on channels not occupied by analog TV stations. It is already difficult enough for the new licensees to launch a new service on their spectrum in view of the continuing DTV transition. If unlicensed operations were permitted on the vacant channels in the Lower 700 MHz band, that would effectively foreclose the band to the licensees who purchased licenses from the Commission in the auctions held in 2002 and 2003.

There is no good reason to auction spectrum and then permit unlicensed operations on the same spectrum, thereby blocking the licensees from deploying anything on the spectrum for which they purchased licenses. It would be fundamentally unfair and contrary to the public interest for the Commission to reverse course now and allow unlicensed operations in these

bands. Licensees who purchase spectrum from the FCC deserve certainty about the rules governing the auctioned band.

Even the NPRM, with its discussion of various theoretical interference mitigation techniques, does not posit any theory by which QUALCOMM and the other Lower 700 MHz licensees could share their licensed spectrum with unlicensed devices. In fact, such sharing would not be possible. For all of these reasons, the Commission should keep Channels 52-69 off limits to unlicensed devices.

### **III. The Commission Should Not Authorize Unlicensed Operations on Channels 2-36 & 38-51 While the DTV Transition Is Ongoing and in the Absence of a Definitive Showing of Non-Interference**

As to any vacant channels within Channels 2-36 and 38-51, the channels identified in the NPRM, QUALCOMM believes that the Commission should not authorize any new unlicensed service while the DTV transition is ongoing and in the absence of a definitive showing of non-interference. This position is based on QUALCOMM's concerns that stem from both of its interests in this proceeding.

From the vantage point of a 700 MHz licensee anxious for an end to the DTV transition to come as rapidly as possible, and supportive of the Commission's extensive efforts to bring that about, QUALCOMM is very concerned that the introduction of unlicensed devices on Channels 2-36 and 38-51 will delay the end of the DTV transition for several reasons. In the first place, the Commission has adopted a complex channel selection process by which TV licensees will select their final DTV channel allotments inside the core Channels 2-51, culminating in the Commission's issuance of a Notice of Proposed Rule Making with a new DTV Table of allotments in August 2006, with a final Order to be issued sometime in 2007. See Second Periodic Review of Commission's Rules and Policies Affecting the Conversion to Digital

Television, Report and Order, FCC 04-192, released September 7, 2004 at paras. 22-67. The DTV transition is not going to end until the channel selection process is completed so that all the DTV stations are operating in the core. This raises a number of important questions, such as: What would happen if a TV station elected a channel, only to find out that unlicensed devices were already operating on the channel? Could the TV station revoke its selection? If so, wouldn't that inevitably delay the conclusion of the channel selection process? If not, what recourse would the TV station have? Would the unlicensed devices be able to move off the channel if a DTV station selected it? Is it possible for the unlicensed devices to move to a different channel, and if so, how long would it take? These critical questions are unanswered—in fairness, the NPRM in the instant proceeding was adopted before the Commission adopted the channel selection process.

QUALCOMM believes that an expeditious end to the DTV transition is, and certainly should be, one of the Commission's highest priorities. The transition cannot end until the channel selection process ends, and the DTV facilities are operational on the finally selected channels. Allowing unlicensed devices to operate on so-called "vacant" channels before the DTV transition ends threatens to prolong the transition because the presence of unlicensed devices will complicate the channel selection process, thereby delaying the date on which DTV facilities are operational on the selected channels.

In the same vein, QUALCOMM is concerned that allowing unlicensed devices to operate on Channels 2-36 and 38-51 before there has been any testing, much less perfection, of the interference mitigation techniques will delay the end of the DTV transition. As the Commission well knows, under current law, the DTV transition will end in a market when 85% of the TV households in the market have a DTV-capable receiver, a digital-to-analog converter, or

subscribe to a cable or satellite service that carries one DTV channel for each TV station broadcasting in the market. 47 U.S. C. 309 (j) (14). The Commission, to its credit, has embarked on a major consumer education campaign called “DTV-Get It!” to encourage consumers to buy DTV-capable sets. QUALCOMM supports this effort by the Commission, but is concerned about the impact on consumers of the introduction of unlicensed devices into the TV bands before there has been a definitive showing of non-interference. It appears contrary to the public interest to introduce unlicensed devices in the TV bands until the 85% threshold has been met to end the transition in a given market. There is a genuine risk that otherwise, consumers who spend substantial sums of money for a DTV-capable set and then experience interference not knowing that the interference was coming from unlicensed operations (such as, for example, apartment dwellers, who are not themselves using an unlicensed device, but live close to an unlicensed user) may well return the DTV-capable set, thereby making it more difficult to reach the 85% mark. Given the Commission’s emphasis on spurring the sales of DTV-capable sets, it is far more prudent for the Commission not to consider the introduction of unlicensed services on vacant TV channels until the 85% threshold has been reached, ending the DTV transition.

QUALCOMM has another concern about the proposal in the NPRM for unlicensed operations on so-called vacant TV channels. After issuing of the NPRM, the Commission authorized digital low power television (“LPTV”) and television translator stations to operate on a secondary basis on Channels 2-13 and 14-59 (except Channel 37) and to a lesser extent on Channels 60-69.<sup>4</sup> A digital LPTV or translator station is permitted on Channels 52-59 only for

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<sup>4</sup> See Amendment of Parts 73 and 74 of the Commission’s Rules to Establish Rules for Digital Low Power Television, Television Translator, and Television Booster Stations and to

on-channel analog to digital conversion. Otherwise, a digital LPTV or translator station is permitted on Channels 52-59 only if it certifies that there is no suitable in-core channel available for this purpose.<sup>5</sup> That limitation could well be undermined if unlicensed services are permitted on vacant channels in the core—i.e., within Channels 2-36 and 38-51. In that event, digital LPTV and television translator stations may be unable to identify a vacant channel in the core because of the presence of unlicensed devices.

As a result, the digital LPTV and television translator stations might very well migrate in large measure to the channels that the FCC has already auctioned to QUALCOMM and others, Channels 54, 55, and 59. That would be a very unfair result, a result contrary to the Commission's goal of ensuring the rapid proliferation of digital TV. The Commission auctioned Channels 54, 55, and 59 before even proposing to allow digital LPTV and television translators on that spectrum. It is bad enough for the Commission to change the rules after the auction to permit new LPTV and translator stations on the auctioned spectrum when they cannot find a channel in the core not used or allocated to a television station. But, now, the NPRM raises the spectre of a much more widespread migration of new LPTV and television translator stations on to the auctioned spectrum if the Commission permits them to certify that there is no vacant channel in the core because there are unlicensed operations on channels that would otherwise be vacant. Although these LPTV and translator stations would operate on a secondary basis, there could well be interference disputes and significant disruptions of DTV service if these stations have to be moved off the air or moved to a different channel because they interfere with operations on the auctioned spectrum.

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Amend the Rules for Digital Class A Television Stations, FCC 04-220, released Sept. 30, 2004, at paras. 68-81.

<sup>5</sup> Id. at para. 71.



The Commission could avoid this disruption of DTV service and these interference disputes by refraining from allowing unlicensed devices on vacant Channels 2 to 51 in the first place. In that event, such vacant channels would be entirely available for the new digital LPTV and television translator stations, thereby fueling the rapid proliferation of DTV service to rural areas, one of the Commission's objectives in carrying out the transition to DTV.

Moreover, from the vantage point of the inventor and developer of the preeminent 3G licensed wireless broadband technologies, QUALCOMM also believes that the Commission should not authorize new unlicensed operations on Channels 2-36 and 38-51 at this time, when there has been no real world showing of non-interference. As noted supra, the NPRM lists a series of theories for how interference from the unlicensed devices would be mitigated, but these theories have not been tested, much less perfected.

QUALCOMM is concerned about the precedent that would be set by authorizing unlicensed operations in a licensed frequency band on this basis. A much more prudent course would be for testing to start on these interference mitigation techniques, while the DTV transition proceeds, and for the Commission to await the outcome of both the DTV transition and the testing and technology development work. The Commission should not authorize unlicensed devices in the TV bands until the interference issues are definitively resolved—not just on paper, but in the real world.

#### **IV. When and If the Commission Authorizes New Services on Channels 2-36 & 38-51, It Should Authorize Licensed Services, Not Unlicensed Services**

As noted supra, the NPRM contains no analysis for why the new services to be introduced in the vacant TV channels are to be unlicensed as opposed to licensed. Instead, the NPRM simply says that allowing unlicensed operations on the vacant TV channels would be “desirable” in light of the “significant growth of and consumer demand for unlicensed wireless

broadband applications and services in recent years. . .” NPRM at para. 7. The NPRM ignores the burgeoning growth in licensed wireless broadband services and undertakes no analysis of whether the recent allocation of another 255 MHz for unlicensed devices in the 5 GHz band and the possible allocation of 50 MHz at 3.6-3.7GHz will be sufficient to meet the demand for unlicensed services. In fact, the NPRM fails even to state any reasons why it is appropriate for the operations in the TV bands to be unlicensed as opposed to licensed. QUALCOMM believes that these omissions are significant and should be corrected by a thorough analysis of the needs of both licensed and unlicensed services for additional spectrum.

In conducting such an analysis, the Commission should bear in mind a fundamental distinction between unlicensed and licensed operations which is particularly important with respect to operations on vacant TV channels and the attendant interference concerns. Licensed services operate under tight, well-defined parameters—the interference from such services can be reliably predicted and avoided, but that is not the case for unlicensed devices. Once unlicensed devices are sold, no one keeps track of where they are used. As a result, it becomes impossible to pinpoint and cure the harmful interference. The NPRM points to interference sensing radios that do not exist. In any event, the interference problems will not be cured simply with interference-sensing techniques. There will still be situations in which the device will not be able to sense that a TV station is operating on a channel, but causes harm to a nearby TV receiver (the so-called hidden terminal problem), and the NPRM is silent on what will prevent unlicensed devices from interfering with one another. All of these factors weighs in favor of the Commission deciding that operations on vacant TV channels should occur on a licensed, not unlicensed, basis.

In addition, in deciding between unlicensed and licensed operations on vacant TV channels, the Commission should review whether there is any practical remedy for interference problems caused by the unlicensed operations. The NPRM says that the unlicensed devices in the TV band would operate subject to the general obligation in Section 15.5 of the Commission's rules not to cause harmful interference and to cease operation upon notification from a Commission representative that the device was causing harmful interference. But, this approach does not appear practical. It is not at all clear how interference from unlicensed devices can be pinpointed, especially once thousands and potentially millions of these devices are operating on a mobile basis. There is no mechanism in place for the recall of millions of these devices. Once these devices are in operation across the country, it will be too late to mitigate the interference.

The NPRM fails to consider at all the highest and best use of the bands in question. The TV bands enable greater propagation of signals than the bands in which unlicensed devices operate today. In an unlicensed band, the incentives of any one user are not to limit power to avoid causing interference. To the contrary, since the spectrum is free, each user's incentive is to maximize its power. This can lead to the so-called tragedy of the commons—since no one user has any incentive to limit its power, no one does so, and the aggregate power is too great for all the users. The spectrum gets trashed, as occurred with CB Radio. The NPRM proposes nothing to prevent this from occurring on the vacant TV channels. The NRPM does not even consider or regulate the aggregate interference from the proliferation of these devices. The spectrum at issue is prime spectrum. If this spectrum is trashed, a valuable public resource will have been ruined. The FCC should not authorize unlicensed devices on this valuable spectrum.

Unlicensed devices should operate on dedicated spectrum allocated for unlicensed operations rather than on licensed spectrum. Such an approach is the best way to avoid

interference problems and to allow both licensed and unlicensed services to flourish. New operations on vacant channels in the licensed TV bands should be licensed, not unlicensed.

**V. Conclusion**

QUALCOMM respectfully requests that the FCC not authorize new services in the vacant TV channels within Channels 2 to 36 and 38 to 51 until the successful conclusion of the DTV transition, and at that time, the FCC should seriously consider authorizing such services on a licensed, not unlicensed, basis, if at all.

Respectfully submitted,

By: /s/Dean R. Brenner  
Dean R. Brenner  
Senior Director, Government Affairs  
QUALCOMM Incorporated  
2001 Pennsylvania Ave., N.W.  
Suite 650  
Washington, D.C. 20006  
(202) 263-0020  
Attorney for QUALCOMM Incorporated

Dated: November 30, 2004